

REMARKS

Favorable consideration of this Application as presently amended and in light of the following discussion is respectfully requested.

After entry of the foregoing Amendment, Claims 1-41 are pending in the present Application. Claims 1, 2, 6-21, and 27-41 have been amended to address cosmetic matters of form. No new matter has been added.

By way of summary, the Official Action presents the following issues: Claims 1, 2, 7, 8, 9-21 and 28-41 are objected to due to informalities; Claims 6 and 27 stand rejected under 35 U.S.C. § 112, second paragraph allegedly being indefinite; Claims 1-3, 5-24, and 26-41 stand rejected under 35 U.S.C. § 102 as being anticipated by Sakoda et al. (U.S. Patent No. 6,563,881, hereinafter Sakoda); and, Claims 4 and 25 stand rejected under 35 U.S.C. § 103 as being anticipated by Sakoda.

OBJECTION TO THE CLAIMS

The outstanding Official Action has objected to Claims 1, 2, 7, 8, 9-21, and 28-41 due to informalities. Applicants have amended the claims in accordance with the Examiner's suggestions.

Accordingly, Applicants respectfully request that the objection to the claims be withdrawn.

REJECTION UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

The outstanding Official Action has rejected Claims 6 and 27 under 35 U.S.C. § 112, second paragraph allegedly being indefinite.

Applicants have amended Claims 6 and 27 to clarify the language "the same" and "different." Further explanation of the subject matter of Claims 6 and 27 can be found beginning on page 23, line 12, of the Applicants' specification. Accordingly, Applicants

respectfully submit that Claims 6 and 27 are definite in view of the Applicants' disclosure; and, Applicants respectfully request that the rejection of Claims 6 and 27 under 35 U.S.C. § 112, second paragraph, be withdrawn.

REJECTION UNDER 35 U.S.C. § 102

The outstanding Official Action has rejected Claims 1-3, 5-24, and 26-41 under 35 U.S.C. § 102 as being anticipated by Sakoda. The Official Action contends that Sakoda describes all of the Applicants' claimed features. Applicants respectfully traverse the rejection.

Multi-carrier transmission systems are known in which information symbols are spread amongst a plurality of sub-carriers having different frequencies. In such systems, amplitude variation and/or phase variation may be introduced to the communication channel as a function of Rayleigh fading based on the relative positional relationship between a mobile station and a base station. As such, it is necessary to identify a phase of a received signal by an absolute phase for each information symbol in a phase modulation form in which information is transmitted at a carrier. Accordingly, pilot symbols are utilized as a method to estimate and compensate for fading and distortion. However, when the information transmission rate is increased in such systems, the occupied frequency band is widened. The widening of the frequency band causes the correlation and the variation in the transmission channel between a respective sub-carriers to vary depending on delay amounts caused by the influence of an echo. As can be appreciated, the correlation of variation between sub-carriers is decreased; and, it is not possible to estimate channel variation precisely by using the pilot symbol of the sub-carrier.¹

¹ Application at pages 1-3.

In light of at least the above deficiencies in the art, the present advancements are provided. With at least the above objects in mind, a brief comparison of the claimed advancements, in view of the cited references, is believed to be in order.

Claim 1 recites, *inter alia*, a multi-carrier CDMA radio transmission method, including:

... enabling a transmission rate of the information to be changed by controlling the amount of information transmitted simultaneously by controlling the number of the information symbols to be used in the spreading into the plurality of sub-carrier components for each user to which the information is to be transmitted.

Sakoda describes a radio telephone system for transmitting data at rates of 32 kbps, 64 kbps, 96 kbps, and 128 kbps. As shown in Fig. 6, communication is conducted in each of these set channels using a multi-carrier signal having transmission symbols distributed among a plurality of sub-carriers. The transmission symbols of each channel of the plurality of set channels are arranged at intervals of N^{th} power of 2, where N is an arbitrary positive number, with respect to a reference frequency interval.² To this end, a coding unit (102) is provided for coding an information bit stream with a predetermined coding rate. Each bit coded by the coding unit is supplied to a symbol mapping unit (103) and mapped to transmission symbols therein. The transmission symbols generated by the mapping unit are supplied to a null symbol insertion unit. The null symbol insertion unit performs processing to make the symbol rate equal to the maximum transmission rate constantly irrespective of the transmission rate of the original information bit stream by regularly inserting symbols having amplitude of zero depending on the transmission rate obtained at the time.³

² Sakoda at column 9, lines 10-26; Fig. 6

³ Sakoda at column 9, lines 41-49.

Conversely, in an exemplary embodiment of the Applicants' advancements, the transmission rate of information is changed by controlling the amount of information transmitted simultaneously. The transmission rate is altered by controlling the information symbols used in spreading across a plurality of sub-carrier components for each user.

As can be appreciated from the description of Sakoda, null symbols are inserted in order to ensure a maximum transmission rate.⁴ Additionally, Applicants note that many of the citations of the Official Action, namely column 6, line 66 – column 7 line 2, and column 7, lines 1-7 refer to reception processing; thus, these citations have no bearing on Applicants' claimed advancement in which a number of information symbols to be used in spreading into a plurality of sub-carrier components for each user is to be transmitted. Sakoda does not disclose, or suggest, controlling the number of information symbols used in spreading among a plurality of sub-carrier components for each user, as recited in Applicants' amended Claim 1, or any claim depending therefrom. Likewise, as Claim 21 recites substantially similar limitations to that discussed above, Applicants respectfully submit that this claim, and any claims depending therefrom, are likewise allowable.

Furthermore, independent Claims 7, 8, 28, and 29 recite additional claimed advancements. In these claims, the number of modulation multi-values or multiplexed transmission intervals are controlled for each user. Thus, as noted in the Applicants' specification at page 26, when the transmission rate is to be increased, then number of modulation levels may be increased. For example, by modulating the transmitted data by 16 QAM (the number of modulation levels: 16) or 64 QAM (the number of modulation levels: 64). Sakoda merely describes that different modulation schemes may be utilized for transmitting data. Likewise, as noted at page 26 of the specification, the transmission rate

⁴ Sakoda at column 9, lines 42-45.

may be increased or decreased, based upon a data transmission interval. As Sakoda does not disclose, or suggest, any of these claimed features, Applicants respectfully submit that these claims, and any corresponding dependent claims, are likewise allowable over the cited reference.

Accordingly, Applicants respectfully request that the rejection of Claims 1-3, 5-24, and 26-41 under 35 U.S.C. § 102 be withdrawn.

REJECTION UNDER 35 U.S.C. § 103

The outstanding Official Action has rejected Claims 4 and 25 under 35 U.S.C. § 103 as being anticipated by Sakoda. The Official Action contends that Sakoda describes all of the Applicants' claimed features, with the exception of the number of information symbols being inversely proportional to the number of sub-carriers. However, the Official Action contends that it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary, select, or optimize numerical parameters. Applicants respectfully traverse the rejection.

As noted above, Sakoda does not disclose, or suggest, all of the elements of the Applicants' claims for which it has been asserted. Accordingly, a *prima facie* case of obviousness has not been presented.

Accordingly, Applicants respectfully request that the rejection of Claims 4 and 25 under 35 U.S.C. § 103 be withdrawn.

CONCLUSION

Consequently, in view of the foregoing amendment and remarks, it is respectfully submitted that the present Application, including Claims 1-41, is patently distinguished over the prior art, in condition for allowance, and such action is respectfully requested at an early date.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Bradley D. Lytle
Attorney of Record
Registration No. 40,073

Customer Number

22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)

Scott A. McKeown
Registration No. 42,866

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